

the Lower Lake Region, and snow in New England on the 16th and during the night of the same day. High winds occurred on the North Atlantic coast after the passage of the centre. The following reports furnished through the co-operation of the New York Herald Weather Service probably indicates the presence of this storm during its passage eastward over the ocean: S. S. *Waesland*, 18th, in 46° 46' N., 38° 52' W., 29.62, a fall of 0.36 inch in past 24 hours, NE. to SE., partly cloudy, with rain during latter part of day; 19th, in 45° 05' N., 45° 42' W., 29.42, SSW., overcast and smooth sea; 20th, in 43° 29' N., 50° 40' W., 29.91, NNW., strong, overcast with snow squalls: S. S. *City of Montreal*, 17th, in 42° 26' N., 60° 18' W., W. to SSW., light breeze, clear; 18th, in 41° 06' N., 65° 35' W., SW. to NW. and N., fresh wind to fresh gale, heavy rain changing to snow, heavy beam sea. S. S. *Britannic*, 16th, in 44° 31' N., 47° 50' W., W. and N., fresh breeze and overcast; 17th, in 42° 53' N., 56° 26' W., variable, light breeze and fine; 18th, in 41° 43' N., 63° 34' W., 29.89, a fall of 0.91 inch in past 24 hours, S. and N., hard gale and high sea. S. S. *Servia*, 18th, in 42° 50' N., 55° 36' W., southerly, moderate breeze; 19th, in 41° 23' N., 62° 08' W., northerly, strong gale and heavy squalls. S. S. *Zeeland*, 17th, in 44° 38' N., 54° 01' W., 29.80, NW. to W. and SW., light breeze and dense fog throughout the whole 24 hours; 18th, in 43° 36' N., 57° 30' W., 29.74, SW. to W. and NNW., fierce gale, tremendous sea, occasional snow squalls; 19th, in 42° 26' N., 59° 28' W., 29.88, northerly gale, weather and sea moderating. S. S. *Celtic*, 17th, in 40° 41' N., 69° 46' W., 29.57, SW., force 4, foggy; 18th, in 41° 04' N., 62° 40' W., 29.95, NW., force 6, cloudy; 19th, in 41° 51' N., 55° 29' W., 29.75, NW., force 6, cloudy.

No. IX.—Was central in Colorado on the morning of the 18th. Rain fell during the day in the Upper Mississippi Valley and Upper Lake Region. The rain area moved eastward into New England and the Lower Lake Region during the 19th, and on the same day heavy and general rains occurred in the Ohio Valley and Tennessee. The following reports furnished by the co-operation of the New York Herald Weather Service probably indicates the presence of this storm during its passage eastward over the ocean: S. S. *Waesland*, 21st, in 42° 19' N., 57° 19' W., 29.93, strong easterly winds, overcast with snow squalls: S. S. *Zeeland*, 20th, in 41° 20' N., 64° 07' W., 29.64, a fall of 0.24 inch in past 24 hours, N. to SW., calm, cloudy; 21st, in 40° 47' N., 69° 11' W., 29.70, N. to ENE. and ESE., light to fresh breeze with occasional rain. S. S. *Wisconsin*, 19th, in 43° 39' N., 53° 54' W., N. to W., heavy gale and snow; 20th, in 42° 23' N., 59° 54' W., N. to E., moderate gale, snow and heavy head sea; 21st, in 40° 48' N., 66° 18' W., N. to SE., gales and snow. S. S. *Assyrian Monarch*, 19th, in 41° 50' N., 63° 45' W., N., heavy gale and high sea.

No. X.—Central in Texas at midnight of the 19th, with heavy rains in West Gulf States. The rain of the 19th, in Tennessee and the Ohio Valley, continued during the 20th. This day rain fell in Lower Lake Region and Middle Atlantic States, and snow in the Upper Lake Region. On the 21st it rained in Tennessee and the Middle Atlantic States, and snow fell in the Ohio Valley, the Lower Lake Region and in New England. Snow continued in the Lake Region and New England on the 22d and 23d, the weather generally clearing in the other districts.

The following reports furnished through the co-operation of the New York Herald Weather Service probably indicates the presence of this storm during its passage eastward over the ocean: S. S. *Waesland*, 22d, in 41° 35' N., 63° 46' W., 29.14, a fall of 0.79 inch in past 24 hours, ESE., partly cloudy changing to stormy weather; 23d, in 40° 44' N., 64° 54' W., 29.48, W., heavy gale with high head sea, ship laboring heavily; 24th, in 40° 17' N., 71° 01' W., 29.96, N., moderating, snow squalls. S. S. *Helvetia*, 22d, in 45° 38' N., 44° 48' W., NE., strong breeze and beam sea; 23d, in 42° 58' N., 50° 20' W., variable, light winds and cloudy; 24th, in 42° N., 55° 10' W., variable, moderate gale and snow squalls; 25th, in 41° 03' N., 60° 57' W., N. to NNE., moderate gale and snow squalls. S. S. *The Queen*, 22d, in 40° 28' N., 69° 42' W., SE. to WNW., heavy head sea and rain. S. S. *Parthia*, 24th, in 46° 13' N., 42° 58'

W., SSW. to WSW. and SE., moderate breeze, cloudy with rain and confused sea. S. S. *Zeeland*, 22d, in 46° 29' N., 73° W., 29.58, a fall of 0.12 inch in past 24 hours, SE. to W. and WNW., strong breeze, rainy and misty. S. S. *Baltic*, 21st, in 43° 03' N., 51° 15' W., W. and NE., variable, cloudy, confused sea; 22d, in 42° 16' N., 58° 55' W., variable, strong winds, squally, rough sea; 23d, in 41° 39' N., 62° 57' W., NW. and N., strong gale, heavy head sea.

No. XI.—Moved down the Missouri Valley on the 27th; on the morning of the 28th it was central near Little Rock, and thence moved NE. to the Lake Region. Heavy and general rains occurred during the passage of this storm in the Mississippi Valley, Tennessee and the Ohio Valley, the East Gulf States, the Lake Region, the Middle Atlantic and New England States.

INTERNATIONAL METEOROLOGY.

International charts Nos. IV and V accompany the present REVIEW for February, 1882. The former is published for December, 1879, and continues the series of that chart, commenced in January, 1877. The "Beobachtungen auf dem Nordatlantischen Ocean" for December, 1879, kindly furnished this office through the courtesy of Prof. Dr. G. Newmayer, Director of the German Marine Observatory, has been used in the preparation of the present chart. Chart No. V is prepared for the month of March, 1880, and continues the series of this chart, commenced in November, 1877.

Chart No. IV shows the mean pressure, temperature and the prevailing direction of the wind at 7.35 a. m. Washington, or 0.43 p. m. Greenwich mean time, for the month of December, 1879, over the Northern, and at certain isolated stations in the Southern, Hemisphere. The pressure is generally high, even over British India, where the mean at no station falls below 29.92. There are two areas of comparative barometric minima, one embracing Iceland and Greenland and the other occupying northeastern Russia and northwestern Siberia. The most decided of the above indicated depressions is the former, lowest mean reading 29.47, at Stykkisholm. This area of barometric minima probably resulted from the translation northward of one of the November depressions (29.90) central over the Azores and Madeira Islands, and its combination with a slight depression (29.80) central that month over Greenland. There are five principal areas of high pressure for the month, distributed as follows: In central Mexico, 30.30; in Manitoba, 30.20; in 35° N., 70° W., 30.20; in western Europe, 30.40; in southeastern Siberia, 30.40. The extreme mean pressures for the month are, 29.47 (lowest) at Stykkisholm and 30.49 (highest) at Nertschinsk. The extreme monthly range of mean pressure for the month is 1.02 inches, which is 0.52 inch smaller than the range for December 1877, and 0.18 inch smaller than the range for the same month in 1878. The following extreme monthly mean temperatures are given in Fahrenheit's scale: *Lowest*: York Factory, -31°; Fort Garry, -18°; Moose Factory, -16°; Nertschinsk, -12°; Fort Buford, -8°; Bismarek, -5°; Nikolaievsk, -3°; Yeniseisk, 1°; Ekaterinburg, 3°; Kasan, 8°; Archangel, 10°; Godthaab, 14°; Szathmar, 16°; Bamberg and Haparauda, 17°; Zurich, 19°. *Highest*: Mauritius, 30°; Paramaribo, 79°; Santiago, Cape Verde Islands and Fort Napier, 78°; Poona and Bridgetown, 77°; Fort de France, Navaissa and Bombay, 76°; Kingston, Jamaica, Santiago de Cuba and San Juan de Puerto Rico, 74°; Honolulu, 71°; Tlacotalpam, 70°. The prevailing direction of the winds over the United States was *southwesterly* in the Atlantic coast States, except *westerly* in New England; *southerly* from the Gulf coast northeastward to the Lakes; *northwesterly* in the Lake Region, Upper Mississippi and Lower Missouri Valleys, Rocky Mountain Slopes and in western Texas; *southerly* in the northern Pacific Coast Region and variable in the Middle and Southern Pacific Coast and Plateau Regions. In Canada and the Maritime Provinces, *westerly*. In Central Mexico, *variable*. Over the Atlantic Ocean from the American coast eastward to 40° W.,

northeast, and northwest; from the European coast westward to 40° W., northeast, southeast and southwest. In Europe, southwesterly north of 50° N. and west of 30° E.; south of that parallel and in Russia, northeast to northwest. In Algiers, northerly. In Hindostan, variable. Along the Asiatic coast and over the Japan Islands, northeast to northwest. Compared with December, 1877 and 1878, the temperature over the United States is considerably lower in the Pacific Coast States, the Rocky Mountain Regions, in the Upper Mississippi and Lower Missouri Valleys, in the Upper Lake Region, St. Lawrence Valley and in the Canadian Maritime Provinces, the change ranging from 3° to 20°, being most marked in the vicinity of the Upper Lake Region. The pressure is considerably higher on the Pacific coast south of Oregon, also in the northern sections of the country and in Canada, while in the southeastern portion of the United States, the barometer shows but little change. Over the Atlantic the pressure is considerably higher south of 50° N. and west of 40° W. In the region of the Azores and Madeira Islands there is a fall of about 0.10 inch. The greatest change occurs north of 50° N., where there is a decrease of 0.05 to 0.20 inch. The change in temperature is very small except north of 50° N., where west of 35° W., there is a decided fall, and to the eastward, a considerable rise. In the various countries of Europe and Asia, the following changes occur: British Isles, temperature slightly lower and the pressure from 0.11 to 0.50 inch higher. Denmark, temperature from 3° to 5° lower and pressure from 0.40 to 0.50 inch higher. Norway, temperature normal and the pressure from 0.01 to 0.20 inch higher. Sweden, temperature from 1° to 3° lower and the pressure from 0.07 to 0.27 inch higher. France, temperature from 3° to 10° lower and the pressure from 0.20 to 0.40 inch higher. Germany, temperature from 4° to 16° lower and the pressure from 0.25 to 0.55 inch higher. Austria, temperature from 10° to 17° lower and the pressure from 0.30 to 0.45 inch higher. Algeria, temperature from 0° to 2° lower and the pressure from 0.15 to 0.25 inch higher. Italy, temperature from 2° to 5° lower and the pressure from 0.20 to 0.35 inch higher. Portugal, temperature from 6° to 9° lower and the pressure from 0.09 to 0.12 inch higher. Spain, temperature slightly lower and the pressure from 0.10 to 0.20 inch higher. Turkey, temperature from 1° to 3° higher and pressure from 0.08 to 0.24 inch higher. Russian Empire, temperature from 1° to 3° higher and pressure from 0.05 to 0.50 inch lower. British India, temperature from 1° to 3° lower and the pressure from 0.01 to 0.05 inch lower. The accompanying table shows the deviations in temperature and barometer at isolated stations for the month of December, 1879, as compared with the means of the past two years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Temperature.			Mean Barometer.		
	Dec., 1877-78.	Dec., 1878.	Departure.	Dec., 1877-78.	Dec., 1878.	Departure.
York Factory.....	-4.0	-31.4	-27.4	29.90	30.06	+0.16
Godthaab.....	13.7	14.0	+0.3	29.67	29.48	-0.19
Stykkisholm.....	29.8	33.3	+3.5	29.68	29.47	-0.21
Thromso.....	29.5	28.8	-0.7	29.59	29.48	-0.11
Thorshavn.....	30.1	41.9	+11.8	29.67	29.80	+0.13
Archangel.....	29.4	10.0	-19.4	30.02	29.58	-0.44
Ekaterinburg.....	10.6	3.2	-7.4	30.53	29.75	-0.78
Barnaul.....	1.0	10.8	+9.8	30.59	31.06	+0.47
Yeniseisk.....	15.6	1.2	-14.4	30.62	30.06	-0.56
Nikolayevsk on the Amoor.....	10.6	3.1	-7.5			
Zi-Ka-Wei.....	40.1	39.0	-1.1	30.37	30.24	-0.13
Tokel.....	40.5	44.1	+3.6	29.89	29.90	+0.01
Pekin.....	23.5	28.8	+5.3	30.38	30.26	-0.12
Tastukend.....	29.6	38.8	+9.2	30.68	30.21	-0.47
Nukuss.....	26.9	33.8	+6.9	30.44	30.10	-0.34
Beirut.....	67.3	62.4	-4.9	30.03	30.02	-0.01
Mauritius.....	80.3	80.2	-0.1	29.95	29.91	-0.04
Fort Napier.....	75.1	75.1	0.0	29.79	29.75	-0.04
Paramaribo.....	81.8	79.0	-2.8	29.98	29.98	Normal
Funchal.....	68.7	65.5	-3.2	30.12	30.10	-0.02
Ponta Delgado.....	63.2	63.1	-0.1	30.09	30.02	-0.07
Angra.....	69.0	67.7	-1.3	30.09	29.94	-0.15
Bridgetown.....	80.4	77.1	-3.3	29.94	29.95	+0.01

Comparative Thermometric and Barometric Means, etc.—Continued.

STATION.	Mean temperature.			Mean barometer.		
	Dec., 1877-78.	Dec., 1878.	Departure.	Dec., 1877-78.	Dec., 1878.	Departure.
Navassa.....	78.7	76.1	-2.6	29.98	30.02	+0.04
San Jose de Costa Rica.....	66.7	64.2	-2.5			
Mexico.....	45.9	45.9	Normal	30.26	30.26	Normal
Melbourne.....	59.7	59.2	-0.5	29.92	29.87	-0.05
Hobart Town.....	59.7	59.5	-0.2	29.69	29.70	+0.01
San Juan de Puerto Rico.....	77.7	74.1	-3.6	30.59	30.06	-0.53
Havana.....	70.2	73.0	+2.8	30.10	30.15	+0.05
Asiatic.....	70.9	72.2	+1.3	30.07	30.09	+0.02
Aden.....	29.7	27.7	-2.0	29.52	29.09	-0.43
Lahore.....	56.3	50.0	-6.3	29.75	29.14	-0.61
Thibet.....	37.3	38.1	+0.8	30.04	30.04	Normal
Laghouat.....	37.8	43.7	+5.9	30.23	30.15	-0.08
Fort de France.....	58.3	50.9	-7.4	30.07	30.29	+0.22
Lisbon.....	73.4	70.3	-3.1	29.87	29.88	+0.01
Madrid.....	45.6	41.9	-3.7	30.14	30.25	+0.11
Capliari.....	53.4	51.3	-2.1	29.88	30.12	+0.24
Sandwich Mause.....	37.5	40.5	+3.0	29.69	30.03	+0.34
Malta.....	62.8	57.6	-5.2	29.95	30.11	+0.16

Chart No. V.—This chart displays the tracings of the probable courses of twenty-eight of the principal storm areas of the Northern Hemisphere for the month of March, 1880. The approximate paths of progressive movement are based upon daily simultaneous international observations to the number of over 650, besides a large mass of irregular data which reaches this office in various ways, from the logs of vessels of the Merchant Marine of the North Atlantic and North Pacific oceans. Concerning the general distribution of the paths of the areas of barometric minima, the following is given: Fifteen areas traversed portions of the United States, six of which entered that country from the British Possessions and four from the Pacific ocean. Twelve of these storms reached the Atlantic ocean, five of which passed eastward beyond the 30th meridian west, and one entered southwestern Europe over Spain. Nine areas traversed portions of Northern Europe and northwestern Asia, five of which came from the Atlantic ocean. Four areas passed northeastward in the vicinity of the Japan Islands. Of the storms first appearing in North America, the following brief descriptions are given: No. 1.—This depression appeared off the coast of British Columbia on the 1st, accompanied by rain and southerly winds in the North Pacific Coast Region. During the day the area of barometric minima moved rapidly southeastward and by the following morning was central in northern Montana; Virginia City, 29.15, a fall of 0.23 inch, SW. fair. 3d, depression central in the northern portion of Upper Mississippi Valley, with a barometric trough of 29.60 running southwestward from Lake Superior to western Texas; Omaha, 29.43 a fall of 0.52 inch, S. cloudy; St. Paul, 29.44, a fall of 0.52 inch, SE. threatening. During the day the northeastern portion of the depression moved rapidly eastward, and on the following morning was central in the Lower St. Lawrence Valley, accompanied by southerly winds and light to heavy rain and snow in the Canadian Maritime Provinces. Chatham, N. B., 29.59, a fall of 0.76 inch, S. cloudy; Windsor, N. S., 29.59, a fall of 0.77 inch, SE. raining; Bathurst, N. B., 29.61 a fall of 0.74 inch, S., snowing. 5th, depression central south of Newfoundland, followed by northerly winds and rising barometer in the Maritime Provinces; in 42° N., 60° W., SSW. and NNW., strong, violent rain squalls; in 43° 29' N., 49° 20' W., WNW., fresh gale, high sea. 6th, in 42° 36' N., 55° 04' W., WNW., fresh gales, high sea; in 44° 45' N., 45° 03' W., S. and SW., heavy gale, with rain squalls; in 45° 08' N., 49° 50' W., strong WNW. gale hauling to NNW; in 43° 18' N., 48° 51' W., 29.27, SW., force 7, cloudy. 7th, in 48° N., 47° W., strong NW. gales, encountered several ice bergs, some apparently 120 feet high; in 43° N., 51° W., W. and NW., strong gale, high cross sea; in 45° N., 43° W., WNW., heavy storm, hail and rain squalls; in 48° N., 34° W., WSW., strong gale; in 48° N., 31° W., NW. to SE., fresh gale to calm;

in 42° 51' N., 52° 49' W., 29.83, NW., force 7, high sea and cloudy. 8th, depression central near 50° N., 40° W. In 47° N., 36° W., SSE. to NW., very stormy, with rain and high sea; in 46° 43' N., 39° 30' W., W. hard gale; in 49° 22° N., 26° 01' W., 29.57, SW., force 7, very high sea and cloudy. 9th, in 48° 29' N., 31° 10' W., 29.27, ENE., force 7, high sea and cloudy. 10th, in 49° 52' N., 29.39' W., S and NW., heavy gales, very high sea; in 48° 27' N., 31° 25' W., NW., strong gale, high confused sea; in 46° 19' N., 38° W., 29.70, NNW., force 4, moderate sea, hailing. Owing to lack of reports the further course of this depression could not be indicated upon the chart. In all probability it did not pass eastward to the main-land of northern Europe because of the high pressures prevailing in that region, ranging from 30.30 to 30.70, highest in Norway. Throughout the whole of western Europe the pressure was above 30.20. No. IV.—Rapidly following area No. I this depression appeared off the coast of British Columbia on the 3d, accompanied by southerly winds and rain and snow in the North Pacific Coast Region. Olympia, 29.40, a fall of 0.23 inch, S., light snow. 4th depression central in Lower Missouri Valley. Dodge City, 29.14, a fall of 0.13 inch, S., cloudy; North Platte, 29.23, a fall of 0.06 inch N., cloudy. 5th central in the Lower Lake Region. Buffalo, 29.22, a fall of 0.42 inch, SW., clear. Kingston, Ontario, 29.21, a fall of 0.54 inch, NE., cloudy; Norwood, Ontario, 29.20, a fall of 0.33 inch, NE., gloomy. The following day this depression combined with area No. I., then central over the ocean southeast of Nova Scotia. No. VI.—Probably central in British Columbia on the 4th; this depression passed rapidly southeastward over the Saskatchewan valley and by the morning of the 6th was central in eastern Dakota inclosed by the isobar of 29.80. 7th, depression central north of Lake Superior, with diminished energy, and during the day passed eastward to the Lower St. Lawrence Valley, becoming central on the following morning over the Gulf. During the 8th the depression disappeared to the eastward over Newfoundland, possibly combining with No. I. No. VIII.—This depression first appeared in the Rio Grande Valley on the 6th, and with slight energy but rapid movement the area passed northeastward over the northern portion of the Western Gulf States, through Tennessee and southern Virginia, reaching the Atlantic Ocean during the afternoon of the 7th, disappearing thereafter in a high pressure area 30.30. No. IX.—Probably central in the Saskatchewan valley on the 7th, the depression moved southward to the Middle Plateau where it was central on the 8th. 9th, depression central in southern California, passing thence east-southeast through Arizona and New Mexico to the Rio Grande Valley, where it was central on the 11th. During this day and the following the depression pursued a very irregular course, disappearing on the 13th in a high pressure area over the eastern portion of the Gulf of Mexico. No. X.—This depression appeared in the Rio Grande Valley on the 8th, and during the day passed northeastward over the western portion of the Gulf and thence across the central portion of the Eastern Gulf States, reaching the South Atlantic coast on the 9th. During the day the centre passed eastward off the coast, and by the following morning was central over the ocean in about 40° N., 60° W. In 39° 31' N., 60° 34' W., 29.13, W., force 6, 12 hours heavy rain, heavy SE. to W. sea. 11th, in 48° 32' N., 38° 15' W., 29.72, ESE., force 6, cloudy; in 45° N., 42° 55' W., 29.04, SW., force 9, very heavy sea, cloudy; in 48° N., 35° W., NW. and S., heavy gales; in 47° 17' N., 37° 20' W., variable winds, heavy gales with dangerous sea; in 45° N., 42° 55' W., 29.30, SW., force 11, heavy gale with rain squalls; in 44° N., 25° W., very heavy SE. gales; in 43° 51' N., 47° 29' W., SSE. to NW., heavy gales and dangerous sea; in 42° N., 53° W., SE. to SW. and NW., stormy, high confused sea; in 43° 32' N., 47° 20' W., SE., W. and SW., fresh to whole gale, with squalls of rain; in 46° 30' N., 47° 40' W., passed large icebergs from 40 to 50 feet high. 12th, in 39° 10' N., 31° 55' W., 29.89, WSW., force 7, cloudy; in 36° 10' N., 32° 15' W., 30.02, W., force 5, confused sea; in 50° 39' N., 33° 17' W., 29.35,

SSE., force 2, drizzling rain; in 44° 11' N., 44° 06' W., 29.46, NNW., force 7, very heavy sea; in 43° N., 52° W., WNW., whole gale; in 43° N., 50° W., NW., heavy gale; in 47° N., 40° W., S. and W., fierce gale, tremendous sea with heavy rain squalls; in 46° 32' N., 40° 19' W., W. and NW., heavy gale, dangerous sea; in 50° 39' N., 33° 17' W., 29.20, SE. by S., strong gale, with rain squalls. 13th, a. m., in 47° 25' N., 27° 42' W., SW., strong gale increasing to nearly a hurricane; 3 p. m., terrific squall from the W., the gale from the S. not ceasing until the squall was upon the vessel without any warning whatever; hurricane from the SW. continued for about one hour with a tremendous sea, completely engulfing the ship; 7 p. m., hurricane from SW. slightly diminished in force, which continued to wane until a moderate westerly gale was reached at 4.30 a. m., of 14th. In 52° 17' N., 27° 14' W., 29.21, violent SE. by E., gale; in 45° 30' N., 43° 26' W., NW., strong gales, violent squalls; in 49° N., 41° W., SW., strong gale, high sea, heavy rain squalls; in 45° N., 44° W., NW., fierce gale, tremendous sea with rain squalls; in 44° N., 43° W., NW., very heavy gale; in 41° 47' N., 28° 30' W., 29.53 SW., force 9, hail storm; in 36° 15' N., 35° 45' W., 29.06 WNW., force 7, showery; in 50° 47' N., 21° 15' W., 29.81, WSW., force 5, heavy rain for one hour; in 42° 58' N., 42° 57' W., 29.76, WNW., force 6, cloudy. 14th, in 36° 05' N., 39° 05' W., 30.04, W., force 6, showery; in 43° 24' N., 25° 20' W., 29.83, SW., force 5, cloudy; in 53° 46' N., 20° 38' W., 29.71, ESE., force 5, fair; in 49° 49' N., 26° 55' W., 29.37, WSW., force 6, heavy rain for two hours; in 44° 26' N., 37° 01' W., 29.58, WNW., force 6, cloudy; in 42° 28' N., 49° 31' W., 29.97, NNW., force 7, very heavy westerly sea, cloudy; in 50° N., 25° W., WSW., strong gale, high sea; in 48° 50' N., 25° 45' W., 29.42, WSW., force 6, tremendous sea, violent squalls of hail and snow; in 44° 30' N., 46° 10' W., NW., fierce gale, high sea; in 48° N., 36° W., NW., strong gale and high sea, heavy squalls of hail and snow; in 43° N., 47° W., NW., fierce gale, tremendous sea, snow squalls; in 42° N., 45° W., NW. very heavy gale. 15th, in 47° N., 40° W., NW. and W., severe gales, high sea, violent squalls of snow and hail; in 43° 37' N., 48° 08' W., icebergs; in 45° N., 53° W., large fields of slab ice; in 45° 27' N., 22° 12' W., 29.63, SW., force 5, showery; in 36° N., 42° 55' W., 30.10, WSW., force 2, overcast; in 45° 37' N., 31° 14' W., 29.62, NW., force 3, cloudy; in 48° 17' N., 32° 27' W., 29.56 W., force 4, hail and snow squalls. 16th, in 46° 50' N., 19° 10' W., 29.64, SW., force 5, showery; in 49° 23' N., 13° 36' W., 29.55, WSW., 4, moderate westerly sea; in 49° N., 20° W., SE. to NW., stormy, with squalls of rain. During this day and the following the depression filled up off the western coast of the British Isles under the influence of a high pressure area 30.20 to 30.40 prevailing over those islands. No. XI.—This depression developed in western Dakota on the 8th as secondary area to No. IX. On the morning of the 9th was central in the northern portion of the Upper Lake Region, inclosed by the isobar of 29.80. 10th, central in the Lower St. Lawrence Valley with diminished energy. During the day the depression passed eastward over the Canadian Maritime Provinces and on the following morning combined with area of No. X, then central southeast of Newfoundland. No. XIII.—This depression developed during the 13th in the Lower Missouri Valley, and on the following morning was central in the Province of Ontario as an area of very slight energy, inclosed by the isobar of 30.00. During the day the depression passed rapidly southeastward over the Lower Lake Region, disappearing off the New England coast, and by the morning of the 15th became central in about 40° N. 55° W.; in 44° 26' N., 52° 58' W., 29.96, NW., force 6; in 42° 04' N., 53° 40' W., 29.36, NE., force 6. 16th, in 44° 28' N., 46° 20' W., NW. gale, high sea with violent squalls; in 46° 30' N., 38° 08' W., 29.37, NW., force 7, heavy snow and hail for three hours. 17th, in 47° 15' N., 39° 15' W., S., force 3, heavy sea; in 48° 19' N., 18° 52' W., 29.23, S., force 3, heavy rain; Angra, Azores, 29.56, a fall of 0.16 inch, W., light rain; in 37° N., 39° W., 29.54, SSW., force 3; in 49° 14' N., 15° 15' W., 29.56, SE., force 9,

high confused sea; in 45° 08' N., 43° 02' W., 29.77, NNW., force 4, rain for three hours; in 48° N., 29° W., SW to NW., severe gale, high sea; in 50° N., 26° W., SW., SE., and SSW., hard gale with squalls and showers; in 49° N., 29° W., SW. and S., strong gales, finally increased to heavy gale from the W., causing severe damage to vessel. 18th, in 50° 55' N., 11° 57' W., 29.89, ESE., force 6, misty; in 48° 02' N., 24° 14' W., WSW., force 2, high sea, rainy weather. During this day and the following the depression slowly filled up over the Bay of Biscay, under the influence of high pressures extending thence from western Europe. No. XVI.—This depression passed northward from the Gulf of Mexico during the latter part of the 14th, and on the following morning was central in Louisiana inclosed by the isobar of 29.90. During this day and the following the depression passed northeastward over Alabama, Tennessee and Virginia, reaching the Atlantic coast at about parallel 40° N., on the afternoon of the 16th. By the morning of the 17th the depression became central in about 40° N., 60° W. In 41° 05' N., 63° 44' W., 29.54, N., force 4, cloudy. 18th, in 43° 36' N., 49° 19' W., 29.20, NNW., force 7, heavy rain for two hours; in 35° 55' N., 54° W., 29.84, NW., force 6, very high sea, violent squalls; in 43° N., 45° W., NW., strong gale, high sea; in 48° N., 34° W., W. and S., severe gales with frightfully high sea; in 48° N., 33° W., NW., strong gale, high sea; in 49° N., 31° W., W. and NW., fresh gale, squalls, showers and high seas. 19th, in 52° 32' N., 27° 05' W., 29.00, S., force 6; in 44° 11' N., 45° 28' W., 28.86, NW., force 10, tremendous sea; in 47° N., 38° W., S., SE. and NW., tremendous gales and very high sea; in 48° N., 36° W., W., SSW. and N., strong gales, squally, showers and high sea; in 47° N., 37° W., WSW. to NW., heavy gale, very high sea; in 47° 40' N., 37° 30' W., S., very heavy gale and tremendous high seas; in 46° 57' N., 29° 44' W., 29.37, WSW., force 6, heavy rain, very high sea. 20th, in 54° 17' N., 19° 46' W., 29.79, S., force 5. During this day and the following the depression filled up off the western coast of the British Isles; the pressure at land stations ranged from 30.20 to 30.46. No. XVII.—This depression entered the North Pacific Coast Region on the 16th, and passing thence southeastward to the Middle Plateau, was central near Salt Lake City on the morning of the 17th. On the 18th the depression passed eastward from the Lower Missouri Valley, and by the following morning became central in the western portion of the Middle Atlantic States. During the afternoon the center passed eastward off the coast accompanied by heavy gales and high seas south of 40° N. and east of 72° W. 19th, in 38° 40' N., 65° W., hurricane from NE., vessel hove on beam ends; in 37° N. 66° W., hurricane from SE. veering to NW., and lasting 24 hours; in about 39° 10' N., 70° 15' W., 9.30 p. m., terrific hurricane from NW. lasting one hour, vessel hove on beam ends and finally abandoned; in 30° N., 61° W., terrific SE. storm which veered around to SW. and NW., barometer 29.31, tremendous sea washing away everything moveable on deck; in 34° N., 71° W., strong gale from NW. and N., with hail and snow squalls; in 37° N., 69° W., during night, violent hurricane from WSW., scud under bare poles for three hours, decks swept. On the morning of the 20th the depression became central in about 40° N., 60° W. In 36° 10' N., 61° 25' W., 29.36, W., force 8, misty; in 42° 07' N., 59° 57' W., 28.77, NNW., force 9, very heavy sea, cloudy; in 40° 01' N., 63° 04' W., 28.53, WNW., force 10, moderate rain, tremendous sea, terrific storm; in 41° N., 64° W., NE. heavy gale, high sea; in 38° N., 63° W., terrible hurricane from SE. to NW., lasting 18 hours, followed by a heavy sea washing everything off deck; in 42° 07' N., 59° 57' W., 28.82, NNW., force 11, violent gales and squalls; in 40° 01' N., 63° 04' W., 28.53, N. by W., force 12, terrific gales and squalls; in 41° N., 60° W., hurricane lasting 24 hours, decks swept by heavy cross seas; in about 34° N., 65° W., terrific hurricane from NW., lasting 36 hours, everything moveable on decks swept off; in 43° N., 55° W., ESE., strong gale, high sea; in 47° N. 40° W., NW., hard gale, squalls, showers and high sea;

in 46° N., 40° W., NW., heavy gale, very high sea; in 42° 47' N., 56° 54' W., 28.55 W. by S., force 11, terrible storm; in 38° N., 62° W., tremendous gale, vessel on beam ends and three men washed overboard; in 37° 10' N., 58° 30' W., hurricane from S. to NW., vessel abandoned; in 38° N., 62° 50' W., 9 a. m., hurricane from ESE. to SSW., heavy seas; 3 p. m., gale increasing; midnight, vessel complete wreck. 21st, in 43° N., 50° W., E. and NW., shifting strong winds, heavy storm; in 43° N., 48° W., winds shifting from S. to E., soon increasing to a heavy gale, after which, shifted from W. to NE.; in 42° 36' N., 41° 34' W., severe SW. gale carried away masts, swept decks, vessel finally abandoned; in 40° 17' N., 46° 35' W., severe gale from W., lasting 72 hours; in 36° 25' N., 63° 40' W., 29.88, WNW., force 3, showery; in 40° 27' N., 65° 55' W., 29.79, SE., force 2, light rain for three hours; in 40° 47' N., 56° 26' W., 29.58, N., force 7, very high northerly sea; in 44° 59' N., 37° 52' W., S., force 5, heavy rain, very high sea. 22d, in 44° 11' N., 40° 24' W., 29.46, NNE., force 8, heavy rain, very high sea; in 42° 14' N., 50° 01' W., 29.46, force 5, snow squalls, high sea; in 43° N., 50° W., N., strong gale, very high sea; in 42° 30' N., 48° W., passed three small icebergs; in 43° N., 49° 36' W., icebergs. 23d, in 50° 16' N., 23° 43' W., 29.41, S. force 5, light rain; in 43° 23' N., 44° 32' W., 29.42, WNW., force 6, heavy rain and high sea; in 44° 36' N., 42° 15' W., 29.28, NW., force 7, sleet, squally, very high sea; in 43° 20' N., 49° W., floe ice extending north and south as far as the eye could reach; in 43° 39' N., 47° 42' W., icebergs, some 30 feet high. 24th, in 48° 55' N., 31° 16' W., 29.06, E., force 2, cloudy; in 47° 02' N., 36° 01' W., 29.35, WNW., force 6, squally, very high sea; in 42° 39' N., 49° 22' W., 29.81, NNW., force 3, snow squalls. 25th, in 49° N., 28° 55' W., WNW., force 6, squally, very high sea; in 47° 20' N., 37° 16' W., 29.61, WNW., force 4, light rain; in 46° N., 36° W., NW. strong, very high sea ship labored heavily. 26th, in 50° 29' N., 20° 35' W., 29.60, S., force 6, raining. 27th, central off the northern coast of Spain; in 46° 17' N., 7° 16' W., 29.84, NE., force 4, drizzling; Bilbao, 29.88, a fall of 0.11 inch, SE., fair; Santiago, 29.76, a fall of 0.02 inch, SE., cloudy; Madrid, 29.84, a fall of 0.15 inch, SE., cloudy. During the 26th and 27th, rain, with SE. to SW. winds prevailed throughout Spain. 28th, depression central in southern Spain, lowest barometer at Murcia, 29.72, ESE., raining; Madrid, 29.93, a rise of 0.09 inch, NE., raining. 29th, central in northeastern Algeria; Biskra, 29.55, a fall of 0.13 inch, SE., force 5, cloudy; Tebessa, 29.63 a fall of 0.17 inch S., force 7, fair; La Calle, 29.60, a fall of 0.17 inch, NE., force 2, threatening. 30th, depression central over Sicily inclosed by the isobar of 29.60. During this day and the following disappeared to the southward over the Mediterranean. No. XX.—This depression appeared in the vicinity of Hudson's Bay on the 18th, and by the following morning was central south of York Factory, barometer, 29.30 a fall of 0.29 inch, N., 27 miles per hour, drifting snow. During the 20th the depression passed rapidly southeastward over Canada and northern New England accompanied by threatening weather and snow in the former. By the morning of the 21st the depression became central over the ocean southwest of Nova Scotia, combining thereafter with area No. XVII. No. XXI.—Appearing northwest of Manitoba on the 20th, this depression passed southeastward over that region during the day. 21st, central north of Lake Superior inclosed by the isobar of 30.00; lowest barometer at Marquette 29.94, a fall of 0.16 inch, W., cloudy. 22d, central in the Lower St. Lawrence Valley, inclosed by the isobar of 29.90. During the day the depression disappeared to the eastward over the Gulf of St. Lawrence. No. XXII.—This depression appeared in Manitoba on the 22d; Fort Garry, 29.68, a fall of 0.35 inch, SE., 16 miles per hour, cloudy; Pembina, 29.60, a fall of 0.38 inch, S., fair. 23d, depression central north of Lake Huron, Parry Sound, 29.64, a fall of 0.30 inch, SE. heavy snow; Alpena, 29.60, a fall of 0.43 inch, W., fair; Rockliffe, 29.69, a fall of 0.21 inch, E., threatening. 24th, depression central off the New England coast followed by northwesterly

winds and snow westward to the Lake Region, and northeasterly winds with cloudy and threatening weather in the Canadian Maritime Provinces. Portland, Me., 29.45, a fall of 0.46 inch, W., fair; Boston, 29.55, a fall of 0.43 inch, NW., fair; Eastport, 29.62, a fall of 0.18 inch, E., 22 miles per hour, cloudy; Quebec, 29.74, a fall of 0.15 inch, E., gale, heavy snow. The following reports show the severity of the storm over the ocean: In 37° 15' N., 70° 50' W., 29.75, NW., force 6, overcast; in 39° 40' N., 72° W., 29.72, NW., force 6; in 39° 10' N., 67° W., terrific gale from NW., accompanied by heavy rain and thunder with vivid lightning, heavy cross sea sweeping decks; off Barnegat, N. J., severe gale from S., lasting 24 hours; 40 miles ESE. of Cape Cod, violent gale from WNW., with heavy cross sea; in 37° 26' N., 61° W., SW. strong gale, with heavy squalls, increasing to heavy gale with high cross sea. 25th, in 33° N., 72° W., violent SW. to NW. storm, vessel struck by lightning; in 41° N., 67° W., SE., NW and N., strong gales, snow squalls, high sea; in 41° 40' N., 62° W., variable, heavy gales, snow squalls, hard frost, very high sea; in 45° 25' N., 49° W., (from Cardiff to New York,) up to this position vessel had passed through 180 miles of ice, encountered heavy drift ice and over 100 icebergs; in 37° 05' N., 66° 25' W., 29.76, W., force 8, squally; off Sandy Hook, 30.21, NW., force 4, squally; in 42° 02' N., 54° 52' W., 29.34, W., force 4, very high sea, rainy. 26th, in 36° 28' N., 41° 24' W., 29.97, SW., force 6, raining; in 37° N., 62° 10' W., 29.84, WNW., force 7, very high sea, hailing; in 45° 28' N., 43° 23' W., 29.35, SSW., force 4, light rain; in 41° 34' N., 58° 23' W., 29.47, NW., force 6, very high sea, rain squalls; in 43° N., 53° W., westerly gale, rain squalls; in 39° N., 61° W., fearful NW. gale. 27th, in 36° 34' N., 71° 30' W., violent southwest gale, lost sails and boats; in 37° N., 47° W., hurricane from SW. to NW., lasting 36 hours, barometer fell to 28.70, decks swept; in 38° 54' N., 38° 35' W., 29.98, SW., force 6, drizzling; in 37° 05' N., 57° 40' W., 30.03, W., force 7, very high sea, cloudy; in 43° 13' N., 49° 27' W., 29.51, W., force 2, light rain; in 40° 02' N., 62° 05' W., 29.98, WNW., force 5, snow squalls. 28th, depression central in about 50° N., 40° W., inclosed by the isobar of 29.80. 29th, in 53° N., 27° W., S. to W. strong gale; in 52° 59' N., 26° 35' W., 29.66, NNW., force 3, fair. 30th, in 51° 40' N., 30° 43' W., 29.45, NW., force 6, very heavy sea, fair weather; Stykisholm, Iceland, 29.01, a fall of 0.78 inch, SE., force 9, snowing. 31st, depression central west of Iceland; Stykisholm, 28.57, a fall of 0.44 inch, SE., force 2, snowing; Thorshavn, 29.03, a fall of 0.65 inch, SE., force 9, raining; Godthaab, 29.71, a rise of 0.11 inch, NNW., force 4, snowing. Throughout the northern portion of the British Isles the pressure fell from 0.20 to 0.60 inch, and the winds shifted to south and southeast, with velocities ranging from 20 to 50 miles per hour. The continuation of this storm will appear upon chart No. V for April, 1880. No. XXV.—This depression entered the coast of British Columbia on the 24th; in 40° 54' N., 133° 02' W., 29.58, NW., force 6, fair; in 48° 21' N., 124° 04' W., 29.49, ESE., force 6, threatening; Olympia, 29.60, a fall of 0.26 inch, W., cloudy. 25th, depression central in the Northern Plateau; Boise City, 29.87, NW., cloudy; Winnemucca, 29.74, a fall of 0.07 inch, W., light snow; Salt Lake City, 29.70, a fall of 0.18 inch, SE., clear. 26th, depression central in the southern portion of the Northern Rocky Mountain Region. Cheyenne, 29.46, a fall of 0.34 inch, W., clear; North Platte, 28.99, a fall of 0.51 inch, S., hazy; Dodge City, 29.09, a fall of 0.26 inch, S., cloudy. 27th, depression central in the Upper Mississippi Valley, inclosed by the isobar of 29.00. St. Louis, 29.16, a fall of 0.62 inch, SE., fair; Keokuk, 28.93, a fall of 0.77 inch, W., cloudy; Davenport, 28.91, a fall of 0.89 inch, SE., light rain; Des Moines, 29.16, a fall of 0.47 inch, NW., light rain. During the day the depression passed rapidly eastward over the Ohio Valley and Middle Atlantic States and by the morning of the 28th, became central off the Atlantic coast in about 40° N., 70° W. Heavy southwest to northwest gales, ranging from 30 to 60 miles per hour, prevailed at coast sta-

tions between the parallels of 34° and 40° N.; northward to 45° N., northeasterly gales prevailed. In 33° N., 72° 10' W., 29.57, SW., hurricane, very high sea, raining; in 42° 28' N., 54° 57' W., 29.62, S., force 1, heavy rain during past 24 hours, hazy; in 40° 55' N., 66° 30' W., 29.10, SW., force 2, heavy rain in past 24 hours, very high sea, misty; in about 34° N., 73° 40' W., 29.30, WSW., force 5; in 34° 49' N., 75° 27' W., 29.49, W., force 3, very rough sea; in 34° 49' N., 75° 27' W., 29.56, violent westerly gale; in 42° N., 63° W., rain and sleet, very unsettled weather with high SW. sea, heavy westerly gale with cross seas; in 36° N., 60° W., very heavy westerly gale. 20th, in 33° 45' N., 70° 10' W., 29.48, NW., force 7, very high sea, raining; in 39° 40' N., 49° 15' W., 29.79, SW., force 7, very high sea overcast; in 41° 48' N., 59° 35' W., 29.22, WNW., force 4, very rough sea, cloudy; in 40° 10' N., 72° 49' W., 29.66, NE., force 4, cloudy; in 35° 31' N., 74° 35' W., 29.66, NNW., force 5, very rough sea, threatening; in 42° N., 61° W., very heavy storm from SW., tremendous gale, very high sea; in 41° 39' N., 60° W., SW. to NW., strong gale, very high sea; in 42° N., 59° W., 29.28, heavy westerly gales. 30th, in 43° 27' N., 43° W., violent westerly gale, dense fog; in 34° N., 67° 50' W., 29.31, N., force 8, very high sea, raining; in 40° 50' N., 45° W., 29.93, SSW., force 5, high sea, rain and fog; in 40° 57' N., 66° 40' W., 29.39, NE., force 6, light rain, very rough sea; in 35° 21' N., 73° 18' W., 29.76, N., 35 miles per hour, very rough sea, stormy. 31st, in 33° 25' N., 65° 20' W., 29.68, WNW., force 6, very high sea, showery; in 42° 05' N., 40° 55' W., 29.98, S., force 4, foggy; off Sandy Hook, 29.75, NW., force 3, clear; Little Glace Bay, N. S., 29.20, a fall of 0.70 inch, SE., 10 miles, raining; Sidney, C. B., 29.26, a fall of 0.65 inch, NE., 14 miles, sleeting; Windsor, N. S., 29.35, a fall of 0.56 inch, N., 29 miles, cloudy; Charlottetown, P. E. Island, 29.41 a fall of 0.47 inch, N., 30 miles, light snow. The continuation of this storm will appear on chart No. V for April 1880. No. XXVI.—This depression appeared off the coast of Washington Territory on the 27th, accompanied by light to heavy rains with southerly winds in the North Pacific Coast Region. 28th, depression central in the Northern Plateau inclosed by the isobar of 29.80. Winnemucca, 29.73, a fall of 0.24 inch, SW., 40 miles per hour, cloudy. During the day the depression remained about stationary, but on the 29th it passed quite rapidly southeastward and by the morning of the 30th became central in the Middle Rocky Mountain Slope. North Platte, 29.30, a fall of 0.35 inch, E., cloudy; Dodge City, 29.36, a fall of 0.32 inch, SE., clear. Changing its course to the northward during the day, the depression on the morning of the 31st became central in the northern portion of the Upper Mississippi Valley inclosed by the isobar of 29.80 and accompanied by southerly winds and light rain. The continuation of this storm will probably appear on chart No. V for April, 1880. Of the storms entering northern Europe the following are briefly described. No. II.—The barometer remained low north of the British Isles after the passage eastward of area No. XVI, chart No. V, for February, 1880, and on the morning of the 1st an area of 28.40 embraced the Orkney and Shetland Islands. North Unst, 28.21, a fall of 0.64 inch, SW., force 8, cloudy. Barometer at all stations in northern Scotland below 28.90, and throughout the remainder of the British Isles below 29.40; winds southwesterly and ranging in velocities from 20 to 45 miles per hour. During the 1st and 2d the depression remained about stationary, but on the 3d moved slowly eastward into southern Norway, where it became central on the morning of the 4th with diminished energy and higher pressure. Bergen, 29.03, a rise of 0.27 inch, WNW., fair; Christiania, 29.11, a rise of 0.26 inch, SSE., foggy; Wisby, 29.16, a rise of 0.13 inch, NW., force 4, cloudy; North Unst, 29.09, a rise of 0.56 inch, NW., force 6, fair. During the day the depression moved rapidly eastward over the Baltic into western Russia, becoming central on the morning of the 5th southeast of the Gulf of Finland. St. Petersburg, 29.35, a rise of 0.69 inch, NNE., raining; Moscow, 29.24, a fall of 0.18 inch, S., snowing; Kieff, 29.44, a fall of 0.07 inch, NW., 18 miles, cloudy; Lugan,

29.38, a fall of 0.53 inch, SSE., cloudy. During the day the depression remained about stationary, and continued a sluggish movement eastward with diminishing energy, until the 8th, when combining with No. VII. near the Ural Mountains, the central area became inclosed by the isobar of 29.00 and the intensity of the storm greatly augmented. Kasan, 29.09, a fall of 0.54 inch, SW., 7 miles, snowing; Ekaterinburg, 28.92, a fall of 0.70 inch, NNW., cloudy. 9th, depression central in the valley of the Obi. Ekaterinburg, 29.13, a rise of 0.21 inch, N., snowing; Barnaul, 29.71, a rise of 0.02 inch, SW., cloudy; Yeniseisk, 29.33 a fall of 0.54 inch, WSW., 25 miles, rain and snow. 10th, depression central in the valley of the Yenisei. Yeniseisk, 29.61, S., 7 miles, cloudy. During the day the depression disappeared to the eastward over northern Siberia. No. III.—This depression appeared in northwestern Russia on the 1st as a continuation of area No. XVI. of Chart No. V. for February, 1880. 1st, Archangel, 28.86, a rise of 0.17 inch, S., light snow; Kasan, 28.94, a fall of 0.66 inch, S., 13 miles, cloudy; Moscow, 29.28, a rise of 0.18 inch, ESE., 13 miles, cloudy; Ekaterinburg, 29.48, a fall of 0.30 inch, S., 9 miles, snowing. 2nd, depression central east of the Ural Mountains. Ekaterinburg, 29.38, a fall of 0.10 inch, W., 7 miles, snowing. 3rd, Barnaul, 29.86, a fall of 0.23 inch, SW., 13 miles, light rain; Ekaterinburg, 29.90, a rise of 0.52 inch, SW., cloudy. During the day the depression disappeared east of the Yenisei. 4th, Yeniseisk, 30.10, SW., clear; Barnaul, 30.31, SW., cloudy. No. V.—This depression appeared on the 3rd over eastern Lapland. Archangel, 28.69, a fall of 0.39 inch, SSW., 13 miles, cloudy. 4th, depression central between the Gulf of Finland and the White Sea. St. Petersburg, 28.96, a fall of 0.19 inch, SSW., light rain; Dorpat, 29.00, a fall of 0.19 inch, WSW., cloudy; Moscow, 29.42, a fall of 0.19 inch, E., cloudy. On the 5th this depression combined with area No. II. No. VII.—This depression appeared off the northwestern coast of Norway on the 5th, becoming central on the following morning in northern Scandinavia inclosed by the isobar of 29.20; Tromso, 29.19, a fall of 0.23 inch, NE., 34 miles, snowing; Brono, 29.55, a fall of 0.10 inch, NW., 22 miles, cloudy; Bergen, 29.69 a fall of 0.02 inch, S., 17 miles, raining; Haparanda, 29.46, a fall of 0.22 inch, S., force 4, cloudy. 7th, central over the White Sea. Archangel, 29.24, a fall of 0.49 inch, SSW., snowing; St. Petersburg, 29.42, a fall of 0.42 inch, WSW., snowing. On the 8th this depression combined with area No. II, then central in eastern Russia. No. XII.—This depression entered northern Scandinavia on the 9th. Tromso, 29.15, a fall of 0.65 inch, SE., raining; Haparanda, 29.30, a fall of 1.05 inches, W., force 6, clear; Archangel, 29.44, a fall of 0.37 inch, cloudy. 10th, depression central in Finland. Archangel, 29.08, a fall of 0.36 inch, E., 13 miles, snowing; St. Petersburg, 29.42, a fall of 0.28 inch, W., 18 miles, cloudy; Haparanda, 29.40, a rise of 0.10 inch, NW., force 6, clear. 11th, depression central in about 60° N., 60° E., inclosed by the isobar of 29.00. Ekaterinburg, 28.84, a fall of 0.63 inch, SW., 31 miles, drifting snow; Kasan, 29.10, a fall of 0.44 inch, NNW., 20 miles, cloudy; Archangel, 29.63 a rise of 0.55 inch, NW., 13 miles, cloudy. 12th, depression central with diminished energy in the valley of the Obi, disappearing during the day over northern Siberia. No. XIV.—This depression appeared east of the White sea on the 14th, inclosed by the isobar of 29.60. On the 15th a barometric trough of 29.60 ran southeastward to the Caspian sea. 16th, central in eastern Russia near Kasan, barometer 29.40, a fall of 0.35 inch, SSE., cloudy; Ekaterinburg, 29.45, a fall of 0.42 inch, E., cloudy. During the 17th and 18th the depression remained about stationary in this region with slowly rising pressure at the centre. 19th, central in the valley of the Obi, with rapidly increasing pressure and by the following morning had disappeared in a high pressure area, 30.40 over western Siberia. No. XIX.—This depression appeared to form south of the Gulf of Finland on the 19th. St. Petersburg, 29.55, a fall of 0.46 inch, N., 16 miles, cloudy; Dorpat, 29.69, a fall of 0.51 inch, N., 20 miles, cloudy; Moscow, 29.54,

a fall of 0.32 inch, SSE., 13 miles, light snow; Wilna, 29.87, a fall of 0.41 inch, WSW., snowing. 20th, Moscow, 29.59, a rise of 0.05 inch, N., cloudy; Wilna, 30.01, a rise of 0.14 inch, N., heavy clouds; Kieff, 29.71, a fall of 0.20 inch, NW., cloudy; Kasan, 29.56, a rise of 0.02 inch, SSE., light snow. 21st, depression central north of the Caspian sea. Astrakhan, 29.67, a fall of 0.46 inch, N., heavy clouds; Tiflis, 29.64, a fall of 0.50 inch, SW., cloudy. During the day the course of the storm changed to the northeast and by the following morning the depression was central in the valley of the Obi. Ekaterinburg, 29.53, a fall of 0.11 inch, WSW., cloudy; Barnaul, 29.80, a fall of 0.44 inch, calm, cloudy. 23rd, central in the valley of the Yenisei, north of parallel 60° N. Yeniseisk, 29.02, a fall of 1.05 inches, SSE., 11 miles, snowing. The continuation of this depression could not be traced owing to the lack of reports from northern Siberia. No. XXIV.—This depression appeared over Finland, on the 23rd, and by the morning of the 24th had passed eastward to about 60° N., 40° E. Archangel, 29.24, a fall of 0.34 inch, WNW., 18 miles, cloudy; Moscow, 29.67, a fall of 0.45 inch, W., cloudy; Kasan, 29.56, a fall of 0.25 inch, SW., 31 miles, cloudy; Ekaterinburg, 29.46, a fall of 0.05 inch, SW., 27 miles, drifting snow. 25th, a barometric trough of 29.60 extended from about 60° N., 60° E., southwestward across Russia to the Black Sea; lowest barometer at Kasan, 29.47, a fall of 0.09 inch, SSE., snowing; Moscow, 29.60, a fall of 0.07 inch, N., snowing; Nikolaiev, 29.92, a fall of 0.44 inch, NNW., 31 miles, sleeting. 26th, depression central in about 60° N., 50° E. Archangel, 29.35, a fall of 0.54 inch, W., 22 miles, snowing; Kasan, 29.58, a rise of 0.11 inch, SSE., snowing. 27th, central in about 60° N., 60° E. Ekaterinburg, 29.27, a fall of 0.41 inch, SW., cloudy; Kasan, 29.31, a fall of 0.27 inch, SSW., cloudy. 28th, central in the valley of the Obi. Ekaterinburg, 29.15, a fall of 0.12 inch, SSW., 18 miles snowing. During the day this depression disappeared in western Siberia under the influence of a high pressure area 30.20. No. XXVIII.—After the disappearance of area No. XXIV the pressure still remained low north of 60° N. and between the parallels of 40° and 60° E. 29th, Archangel, 29.39, WNW., 22 miles, light snow; Kasan, 29.36, NW., 22 miles, cloudy; Ekaterinburg, 29.44, SW., cloudy. 30th, depression central with diminished energy in northeastern Russia, inclosed by the isobar of 29.80. 31st, depression disappeared in northwestern Siberia, under the influence of a high pressure area, 30.20. Concerning the storms off the Asiatic coast the following brief descriptions are given: No. XV.—On the morning of the 15th the barometer at Pekin read 29.80, a fall of 0.31 inch, SW., clear. 16th depression central over the Japan Sea; barometer at Japanese stations fell from 0.08 to 0.15 inch, with cloudy and rainy weather. During the day the depression disappeared eastward over the ocean. No. XVIII.—This depression appeared over the Yellow Sea on the 18th and by the following morning became central north of the island of Nippon. 19th, Wakayama, 29.32, a fall of 0.70 inch, S., 20 miles per hour, 1.37 inches rain-fall in past 24 hours, cloudy; Tokei, 29.59, a fall of 0.48 inch, S., 20 miles per hour, 1.54 inches rain-fall in past 24 hours, light rain; Hiroshima, 29.56, a fall of 0.46 inch, N., 16 miles per hour, 0.91 inch rain-fall in past 24 hours, fair; Nagasaki, 29.81, a fall of 0.19 inch, WNW., 1.02 inches rain-fall in past 24 hours, clear; 20th, depression central over the ocean, followed at land stations by a rise in barometer of from 0.30 to 0.85 inch, winds shifting to northerly, with clearing weather. No. XXIII.—This depression was probably central southeast of the Leu Chen Islands on the 22d. By morning of the 23d, in pursuing a course northeastward, the depression had reached a position north of the Bonin Islands. At most stations on the Island of Nippon the winds shifted to northerly, with rapidly falling barometer. Tokei, 29.58, a fall of 0.67 inch, NNW., 15 miles per hour, 1.05 inches rain-fall in past 24 hours, light rain; Wakayama, 30.05, a fall of 0.11 inch, NNW., fair; in 33° 44' N., 137° 57' E., 29.70 NW., force 6, rough sea, squally weather. 24th, Tokei, 30.08, a rise of 0.50 inch, NNW., clear; Wakayama, 30.28, a rise of 0.23

inch, N., clear; Hiroshima, 30.33, a rise of 0.11 inch, NNE., clear; Nagasaki, 30.37, a rise of 0.11 inch, NNE., clear. During the day the depression disappeared eastward over the ocean. No. XXVII.—This depression appeared in southeastern China on the 28th. S. S. *Monocacy*, U. S. N., at Shanghai, barometer 29.80, a fall of 0.22 inch, S., force 1, clear; S. S. *Palos*, U. S. N., at Shanghai, barometer 29.83, a fall of 0.22 inch, SSE., force 2, cloudy. 29th, position of central disturbance uncertain, probably south of the Island of Kiusin. Hiroshima, 29.98, a fall of 0.03 inch, NNE., fair; Nagasaki, 30.01, N., threatening; Tokei, 29.65, a fall of 0.35 inch, NW., 13 miles, 1.22 inches rain-fall in past 24 hours, raining; Wakayama, 29.86, a fall of 0.19 inch, NW., cloudy. 30th, Hiroshima, 29.88, a fall of 0.10 inch, W., fair; Nagasaki, 29.87, a fall of 0.14 inch, SE., clear; Tokei, 30.05, a rise of 0.40 inch, ENE., cloudy; Wakayama, 29.94, a rise of 0.08 inch, N., cloudy. 31st, Hiroshima, 29.88, no change, N., fair; Nagasaki, 29.99, a rise of 0.12 inch, WNW., clear; Wakayama, 29.73, a fall of 0.21 inch, WNW., 13 miles, clear; Tokei, 29.43, a fall of 0.62 inch, 17.78 m.m. rain-fall in past 24 hours, cloudy. April 1st, Hiroshima, 30.03, a rise of 0.15 inch, NNE., clear; Wakayama, 30.01, a rise of 0.28 inch, N., cloudy; Tokei, 29.87 a rise of 0.44 inch, NNW., clear. During the previous day the depression disappeared eastward over the ocean.

Ocean Ice.—January 30th, 1882. In 47° 30' N., 48° 35' W., S. S. *Glamorgan* passed large iceberg about 40 feet high. On February 1st, the same steamer passed in 46° 43' N., 52° 24' W., a great quantity of field ice extending 40 miles in length. 9th, in 47° 30' N., 47° W., S. S. *Averill*, reported a large quantity of field ice and several large icebergs. 11th, in 46° 30' N., 45° 30' W., S. S. *Australia*, passed through large quantities of field ice and saw several icebergs; in 46° 34' N., 48° 37' W., S. S. *Pollux* reported large quantities of field ice; in 47° 19' N., 47° 18' W., S. S. *Vandalia*, reported large quantities of field ice; in 46° N., 46° W., S. S. *Brooklyn City* saw large iceberg and four hours later large packs of ice. 15th, in 47° 05' N., 44° 30' W., S. S. *P. Caland* passed large iceberg and considerable quantities of floating ice up to 45° 40' N., 46° 43' W. 16th, in 47° 50' N., 46° 30' W., S. S. *Thingralla* passed large quantities of field ice and several icebergs; in 46° 20' N., 47° 18' W., S. S. *Assyrian* passed large iceberg. 17th, in 47° 10' N., 46° 50' W., S. S. *Ethiopia* passed iceberg and large quantities of field ice. 18th, in 46° 20' N., 45° 55' W., in 46° N., 46° 55' W., and in 46° 20' N., 47° 16' W., S. S. *Bolivia* passed several large icebergs; in 45° 57' N., 47° 54' W., S. S. *The Queen* passed large iceberg and field ice. 19th, in 46° 10' N., 46° 30' W., S. S. *Cimbria* passed large quantities of field ice, vessel compelled to sheer south for 12 hours; in 47° 40' N., 43° 28' W., S. S. *State of Indiana* passed large iceberg. 20th, in 46° 21' N., 41° 40' W., S. S. *Cornwall* passed several large icebergs and some field ice; in 46° 30' N., 47° 25' W., S. S. *Plantyn* passed iceberg about 100 feet in height, and four hours afterward a large ice island; Brig *Trusty* at Trepassy from Crookhaven, passed 300 miles of drift ice off the coast of Newfoundland. 21st, in 45° 19' N., 49° 58' W., S. S. *Cornwall* passed several large icebergs and some field ice.

TEMPERATURE OF THE AIR.

The distribution of mean atmospheric temperature over the United States and Canada for the month of February, 1882, is exhibited by lines of equal thermometric mean values upon chart No. II. The table of mean and comparative temperatures in the right-hand corner of the chart shows, in the first column, the average for the month throughout the various districts, as deduced principally from observations taken at Signal Service stations. In the two remaining columns are shown the means for the present month, and the departures of such means from the average for many years. The temperature is everywhere above the normal east of the 107th meridian, the departures of excess ranging from 2°.5 in New England to 9°.9 in the Upper Mississippi Valley. Six districts report a mean temperature, which on the average is 8° or more above

the normal. Throughout the remainder of the country the temperature is below the normal, the departures of deficiency ranging from 1°.7 in the Southern Plateau to 7°.2 in the Middle Plateau. All of the districts but one, comprising this area, report a mean temperature which on the average is nearly 6° below the normal. As a means of interesting comparison, the following maximum departures from the normal are given for each year since 1874, together with the corresponding districts: 1875, —17°, Minnesota and —15°.2 Upper Lake Region; 1876, +4°.7 Lower Missouri Valley and +4°.6 Upper Mississippi Valley; 1877, +13°.4 Minnesota, +11°.5 Upper Mississippi Valley and +10°.9 Lower Missouri Valley; 1878, +18°.7 Minnesota, +16°.4 Upper Missouri Valley and +13°.3 Upper Mississippi Valley; 1879, +8°.3 Salt Lake City, +7°.1 Tucson and —6°.4 St. Lawrence Valley; 1880, +6°.5 Lower Lake Region, +6°.2 Middle Atlantic States and —5°.3 Northern Rocky Mountain Slope; 1881, —6°.0 Missouri Valley, —5°.0 Middle Rocky Mountain Slope and Upper Mississippi Valley and +6°.3 Salt Lake City.

Deviations from Mean Temperatures.—Under this heading departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures on the right-hand side of chart No. II. The following items of importance, in connection with this subject, are reported by Voluntary Observers: *Illinois*: Riley, mean temperature, the highest ever recorded at this place, being 10°.2 above the mean of February for the past 21 years, and 1°.6 above the highest monthly mean previously recorded, which occurred in 1878. Its maximum temperature has not been exceeded during that period, but was just equalled in February, 1861. Mean temperature of winter of 1881–2 is 27° 8 or 6° 8 above the average of the past 19 winters; only the winters of 1870–1 and 1877–8 were warmer; the mean temperature of the winter of 1862–3 was just equal. The maximum temperature of past winter has only been exceeded once, viz., in December, 1877; the minimum of each winter during the past 19 years has been lower than that of the past winter. *Indiana*: Vevay, mean temperature, 45° 52 or 10° above the average of the past 17 years, and 19° 5 above the mean of the coldest month (February, 1875) which was reported during that period. Maximum temperature for February, 1882, is 5° lower than that of 1866 and 1869. *Iowa*: Clinton, mean temperature nearly 12° above the average. *Kansas*: Manhattan, mean temperature 40° 4 or 8° 09 above the average of the past 22 years; highest mean during that period, 39° 18, occurred in 1878, and the next highest, 36° 93, occurred in 1876. Wellington, mean temperature 40° 1 or 6° 2 above the average of the past 3 years. Lawrence, mean temperature 41° 65 or 8° 66 above the average of the past 14 years; during that period the highest mean, 40° 22, occurred in 1878, and the lowest, 25° 78, occurred in 1881. Yates Centre, mean temperature, 39° 6 or 9° 6 above the mean of past 2 years. *Maine*: Gardiner, mean temperature 21° 13 or 0° 53 above the average of the past 46 years. *Maryland*: Fallston, mean temperature, 36° 8, which is the highest, with the exception of 1880, that has occurred during the past 12 years. *Michigan*: Thornville, mean temperature fully 10° above the average of the past 15 years. *Missouri*: St. Louis, Missouri Weather Service reports mean temperature 43° 8 or 8° 6 above the average of the past 45 years; 0° 3 below the mean of the warmest February, which occurred in 1845, and 23° above the mean of the coldest February, which occurred in 1838. *New Hampshire*: Contoocookville, mean temperature 25° 3 or nearly 3° 0 above the February average for the past 12 years. *New York*: North Volney, mean temperature 28° 39 or 6° 34 above the average of the past 13 years; the highest February mean for that period, 27° 93, occurred in 1877, and the lowest mean, 13° 19, occurred in 1875; mean temperature for winter of 1881–2 at 7 a. m., 25° 16; 2 p. m., 32° 47; 9 p. m., 27° 58; mean for winter, 28° 14; average winter mean for past 13 years, 23° 21; highest winter mean, 28° 67, occurred in 1880; lowest winter mean, 17° 79, occurred in 1875. Palermo, mean temperature, 26° 4 or 5° above the average of February for the past 29 years;